

Genetic Correlation Studies in Safflower (*Carthamus Tinctorius* L.)

Kurhade G. M.¹ and S. U. Charjan²

- 1 Former P.G. Student, Botany section, College of Agriculture, Nagpur.
- 2, Assistant Professor of Botany section, College of Agriculture, Nagpur.

ABSTRACT: Present study was conducted to estimate the correlations among the different parameters which is directly correlated with seed yield and oil content in safflower with other traits. The recurrent selection experiments are mainly designed and conducted for improving seed yield plant¹. In the present study, days to 50 % flowering exhibited significant and negative correlation with number of capitula plant¹ (-0.26**), 100 seed weight (-0.21*) and seed yield plant¹ (-0.25**) and also exhibited significant and positive correlation with plant height (0.30**). Plant height exhibited significant and positive correlation with days to maturity (0.22*) and oil content (0.26**). The number of primary branches plant¹ exhibited significant and positive correlation with number of capitula plant¹ (0.72**) and seed yield plant¹ (0.60**). Number of capitula plant¹ exhibited significant and positive correlation with seed yield plant¹ (0.78**). Number of seed capitulum¹ showed that significant and negative correlation with 100 seed weight (-0.40**) and exhibited significant and positive correlation with seed yield plant¹ (0.23*). 100 seed weight exhibited significant and negative correlation with oil content (-0.28**). Days to maturity (-0.17) and oil content (0.14) showed non-significant correlation with seed yield plant¹.

In the present study, days to 50 % flowering and days to maturity exhibited negative correlation with seed yield plant¹ indicating breaking of positive correlation to negative correlation. This study on correlation and reports mentioned above will facilitates selection of recombinant lines with high yield and earliness.

Key words:- Safflower, Half sib-families, Genetic correlation and Random mating population.

INTRODUCTION

Safflower (*Carthamus tinctorius* L.) is a member of the composite, family Asteraceae. There are twenty five species in this genus. Out of which only *Carthamus*

tinctorius L. (2n = 24) is cultivated. Safflower is cultivated mainly for its seeds, which yield edible oil traditionally. Besides, it contains 30% oil in Indian varieties. The oil constitutes 76 per cent of Linoleic acid (PUFA) which helps in reducing cholesterol level in human blood. Earlier varieties of safflower have the genetic potential to give yield of 15-20 q/ha with oil content of about 30-40% under optimum condition. However attempts to further improve the yield and oil content were not successful for the last three decades. This may be due to, use of pedigree selection technique in population derived from two line crosses and negative correlation between seed yield and oil content. Conventional breeding methods have not been very efficient for improving quantitatively inherited characters like seed yield and oil content. Moreover regular methods of breeding have several limitations to use available genetic resource (Jensen, 1970). These limitations may be overcome by application of recurrent selection method in self-pollinated crop.

Therefore, present study was conducted to estimate the correlations among the different parameters which is directly correlated with seed yield and oil content in safflower with other traits.

MATERIALS AND METHODS

The experimental material consisted of Safflower population developed by crossing HUS-MS-305 and 62 male parents out of which 25 crosses were developed at AICRP, Akola, 25 crosses at AICRP, Solapur and 12 crosses were developed at Botany Section, College of Agriculture, Nagpur during 2008. The F₁s were raised in 2009 in respective research stations and equal amount of F₁s seeds were mixed and base population was constructed. The base population was raised in 2010 and composited to form random mating population. Half sib seed were harvested from individual male sterile plants. 105 families were developed from random mating population. These 105 half-sib families developed were grown in *rabi* 2011 along with check viz. Bhima, A1, AKS-207 and AKS-68 for evaluation in augmented block design with five blocks. Each block consisted of 21 half-sibs and 4 checks. Row to row and plant to plant spacing was maintained as 45 x 45 cm. The recommended packages of practices were followed to raise good crop. The data were recorded on five competitive fertile plants from each family on seven characters viz., plant height (cm), number of

primary branches plant⁻¹, number of capitula plant⁻¹, number of seeds capitulum⁻¹, 100 seed weight (g), oil content (%) and seed yield plant⁻¹ (g) except days to 50% flowering and days to maturity for which data was recorded on plot basis. The mean data of five observational plants from each family were used for statistical analysis, analysis of variance for experimental design as suggested by Federer (1961) and estimation of simple correlation as suggested by Hallauer and Miranda (1989).

RESULTS AND DISCUSSION

The recurrent selection experiments are mainly designed and conducted for improving seed yield plant⁻¹. However, this does not mean that other traits are unimportant. The simple correlations among different traits were estimated and presented in Table 1. In the present study, days to 50 % flowering exhibited significant and negative correlation with number of capitula plant⁻¹ (-0.26**), 100 seed weight (-0.21*) and seed yield plant⁻¹ (-0.25**) and also exhibited significant and positive correlation with plant height (0.30**). Plant height exhibited significant and positive correlation with days to maturity (0.22*) and oil content (0.26**). The number of primary branches plant⁻¹ exhibited significant and positive correlation with number of capitula plant⁻¹ (0.72**) and seed yield plant⁻¹ (0.60**). Number of capitula plant⁻¹ exhibited significant and positive correlation with seed yield plant⁻¹ (0.78**). Number of seed capitulum⁻¹ showed that significant and negative correlation with 100 seed weight (-0.40**) and

exhibited significant and positive correlation with seed yield plant⁻¹ (0.23*). 100 seed weight exhibited significant and negative correlation with oil content (-0.28**). Days to maturity (-0.17) and oil content (0.14) showed non-significant correlation with seed yield plant⁻¹.

In the present study, days to 50 % flowering and days to maturity exhibited negative correlation with seed yield plant⁻¹ indicating breaking of positive correlation to negative correlation. Therefore, selection of high yielding families with early maturity is possible.

Mummaneni (2003) reported positive and significant correlation for days to 50 % flowering (0.875**), plant height (0.865**), days to maturity (0.879**), number of primary branches plant⁻¹ (0.672**) and number of capitula plant⁻¹ (0.802**). Naole (2004) also reported significant and negative correlation between seed yield plant⁻¹ and days to maturity (-0.377**) showing that unfavorable gene combination can be broken by recurrent selection. Goyal (2006) reported in random-mating population of safflower that seed yield plant⁻¹ exhibited positive and significant correlation with days to maturity (0.316**). Deshmukh (2009) reported that days to 50 % flowering (-0.21**) and days to maturity (-0.07) had negative correlation with seed yield plant⁻¹ indicating breaking of positive correlation to negative correlation. This study on correlation and reports mentioned above will facilitates selection of recombinant lines with high yield and earliness.

REFERENCES

- Deshmukh, S. G. 2009. Genetic gain from half-sib recurrent in safflower (*Carthamus tinctorius* L.). M.Sc. thesis Dr. PDKV, Akola.
- Federer, W. T. 1961. Augmented designs with one-way elimination of heterogeneity. *Biometrics*, 17: 447-473.
- Goyal, V. S. 2006. Evaluation of third cycle of recurrent selection for seed yield and its components in safflower (*Carthamus tinctorius* L.). M.Sc. thesis Dr. PDKV, Akola.
- Hallaur, A. R. and J. B. Miranda, Fo. 1989. Selection and breeding methods in K.J. Frey (ed.) *Plant breeding II*. The Iowa State University Press, Ames. USA.
- Jensen, N. F. 1970. A diallel selective mating systems for cereal breeding. *Crop Sci.* 10 (6) 629-635.
- Mummaneni, B. N. 2003. Recurrent selection for yield in safflower using genetic male sterility. M.Sc. thesis Dr. PDKV, Akola.
- Naole, V. P. 2004. Recurrent Half-sib selection for yield in random-mating population of safflower (*Carthamus tinctorius* L.) M.Sc. thesis Dr. PDKV, Akola.

Table 1. Simple correlation among nine quantitative characters for half- sib family selection.

* Significance level at 5 % (0.190), ** Significance level at 1 % (0.248)

Characters	Plant height (cm)	Days to maturity	No. of primary branches plant ⁻¹	No. of capitula plant ⁻¹	No. of seed capitulum ⁻¹	100 seed weight	Oil %	Seed yield plant ⁻¹
Days to 50% flowering	0.30**	0.71**	-0.16	-0.26**	0.04	-0.21*	0.03	-0.25**
Plant height (cm)		0.22*	0.06	0.09	0.07	-0.08	0.26**	0.08
Days to maturity			-0.07	-0.08	-0.02	-0.14	-0.01	-0.17
No. of primary branches plant ⁻¹				0.72**	0.05	0.10	0.16	0.60**
No. of capitula plant ⁻¹					-0.01	0.17	0.08	0.78**
No. of seed capitulum ⁻¹						-0.40**	0.19	0.23*
100 seed weight (g)							-0.28**	0.10
Oil content (%)								0.14